

Listing of Claims

1. (Withdrawn) An embedded controller comprising:

an external input processing means which makes data from either of the input signal measured with the sensor or the input signal received from another embedded controller;

a control operation means which obtains control data based on the control data obtained by at least one of the concerned or another control operation means;

an external output processing means having a plurality of control operation means, which generates the control signal to drive an actuator based on the control data obtained by the concerned control operation means,

a control basis processing means which manages the execution sequence of said external input processing means, said external output processing means, and said control operation means; and

an interface means which manages the handing over of the control data between the concerned control operation means and another control operation means, and an operation executive order to said control operation means according to the request from said control basis processing means;

wherein said interface means is provided every said control operation means.

2. (Withdrawn) An embedded controller according to claim 1, wherein said interface means preserves said control data calculated by said control operation means corresponding to said interface means.

3. (Withdrawn) An embedded controller according to claim 2, wherein other interface means refers to said control data of said control operation means preserved by said interface means.

4. (Withdrawn) An embedded controller according to claim 3, wherein said interface means collects said data used when said control operation means corresponding to said interface means calculates referring to said control data preserved by other interface means or preserve or said control data preserved by the concerned interface means.

5. (Withdrawn) An embedded controller according to claim 4, wherein said interface means specifies said control data to be calculated by said control operation means, and orders the execution of the operation processing by said control operation means, with said data collected by said interface means and used for the operation by said control operation means referred, when said control operation means calculates.

6. (Withdrawn) An embedded controller according to claim 1, wherein said interface means preserve the control data which is the calculation result by said control operation means, and wherein only one control data is preserved every control operation means.

7. (Withdrawn) An embedded controller according to claim 1, wherein said control operation means are one that the source code of the programming language is generated automatically based on the control model where data referred in the operation and said control data where the specific operation procedure and result are output are described.

8. (Currently Amended) An embedded controller development tool that generates a plurality of control operation means described as a function in the source code of the program, reference data used for calculation by said control operation being an argument of the function, and control data calculated by said control operation means being a return value of the function or the argument of the function which points the address, comprising:
an analyzing means which extracts the specified information including at least one of the function name of the function, the argument of the function, and the return value or address of the function from the source code of said control operation means; and

an interface generating means which generates an interface means that manages the handing-over of the control data between said control operation means and another control operation means as a source code of a program, corresponding to each of said control operation means based on said specified informationwhich generates an interface means for preserving and outputting a control data calculated by the control operation means based on a specific computational procedure, and providing said control data to a plurality of control operation means including said control operation means;

wherein the control operation means is described as a function in the source code of the program, the reference data used for calculation by said control operation is an argument of the function, said control data calculated by said control operation means is the argument of the function which points the return value or the address of said function,

further comprising;

an analyzing means which extracts the specified information from the source code of said control operation means;

an interface generating means which generates said corresponding interface means every control operation means based on an analytical result of said analyzing means.

9. (Currently Amended) An embedded controller development tool according to claim 8, wherein

said specified information includes control data name of the control data and type information on the control data, and

said interface generation means declares the control data name and the type information, and provides the declaration for allocating a specific memory area for said control data onto the embedded controller to the source code of said interface means
~~the source code of said interface means generation means provides the control data declaration for the interface means generation means to allocate the preservation area for said control data onto the embedded controller based on control data name of said control data which is the calculation result of the control operation means extracted by the analyzing means and type information on said control data which is the calculation result.~~

10. (Currently Amended) An embedded controller development tool according to claim 8, wherein

said specified information includes number of reference data and reference data name of the reference data, and

said interface generating means provides read-out function of data used for the calculation from the number of the reference data and the reference data name of the reference data which are provided from an external input processing means and another interface means to the source code of the interface
~~means~~
~~interface generating means includes the function to read the data which the interface means generation means uses for the source code of the interface~~

~~means to calculate from the external input processing means and other interface means is provided based on the reference data name of said reference data used to be numerical of said reference data used to calculate of the extraction with the control operation means analysis tool and to calculate.~~

11. (Currently Amended) An embedded controller development tool according to claim 8, wherein

said specified information includes control data name of the control data,
and

said interface generation means provides a macroinstruction or a function for demanding update of said control data to the source code of the interface means based on said control data name~~the interface means generation means provides the function to demand the update of said control data where said control basis processing means etc. are calculation results of the control operation means or the macroinstruction to the source code of the interface means based on said control data name of a said control data to which is the calculation result of the control operation means extracted by the control operation means analysis tool.~~

12. (Currently Amended) An embedded controller development tool according to claim 8, wherein

said specified information includes control data name of the control data,
and
said interface generation means provides a macroinstruction or a function
for referring control data specified based on said control data name to the source
code of the interface means-the interface means generation means provides the
function to refer said control data where said control basis processing means etc.
are calculation results of the control operation means or the macroinstruction to
the source code of the interface means based on said control data name of a said
control data which is the calculation result of the control operation means
extracted by the control operation means analysis tool.

13. (Currently Amended) An embedded controller development tool
according to claim 8, wherein

the source code of the programming language is generated automatically
based on a control model where the reference data, the specific operation
procedure and the control data are describedsaid control operation means is the
one that the source code of the programming language is generated
automatically based on the vehicle control model where the data which outputs
the specific operation procedure and operation result and the data referred for
the operation are described.

14. (Original) An embedded controller developed by using a development tool according to claim 8.

15. (Withdrawn) A controller for the vehicle control which output a control signal to control the internal combustion engine or transmission gear based on the instruction of a driver and the state of the engine measured by a sensor or an input signal from the outside received from other vehicle control controllers, comprising:

an external input processing means which makes data the input signal from the outside which is measured with sensor or received from other embedded controllers;

a plurality of control operation means which calculates data from data of input signal and the calculation result of other control operation means based on specific computational procedure;

an external output processing means which outputs a control signal to control an internal combustion engine or an transmission gear based on data calculated by control operation means;

a control basis processing means which manages the execution sequence of said external input processing means, said external output processing means, and said control operation means; and

an interface means which manages the handing over to said control operation means and the execution order from said control basis means to said control operation means in each said control operation means.

16. (Withdrawn) A controller for a vehicle control according to claim 15, wherein said control operation means is the one that the source code of the programming language is generated automatically based on the vehicle control model where the data which outputs the specific operation procedure and operation result and the data referred for the operation are described.

17. (Previously Presented) A controller development tool, wherein the controller for vehicle control is developed by the controller development tool according to claim 8.